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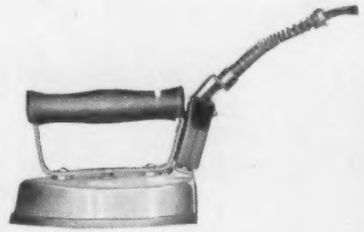

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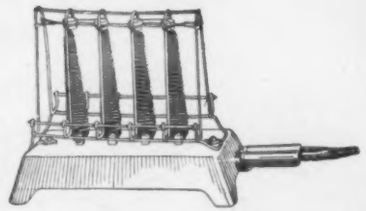

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RURALIZING ELECTRICITY—THE TIRELESS FARMER

BY JAMES E. DAVIDSON.

[This paper, presented before the N. W. Electric Light & Power Association Convention, September, 1913, deals principally with conditions in rural districts in northwestern states, but the article is of general interest in that methods to be followed in securing this class of business are clearly stated and attention is also directed toward the necessity for the intensive cultivation of this new field if satisfied and profitable customers are to result.—The Editor.]

This paper deals with the more important uses of electricity in rural districts, in the order that they should be taken up by a central station manager from the time first thought is given to the subject, assuming that it has been decided to work for business in rural districts and to follow it to a point where an earning is assured.

The geographical scope of the paper will touch on conditions in Washington, Oregon and Idaho.

If transmission and distribution lines are erected on a large scale, returns should not be expected within five years, and a return of a clean 10 per cent, which this kind of pioneering and full-of-chance business deserves, within, say, eight or ten years.

Choose first the most inviting market, if possible along transmission lines where wires can be strung without pole cost. Carefully determine what light and power business is available. The majority of

An Electrically Operated Farm. The Cows Have Been Milked Electrically for More than a year.

The First Consideration.

The introduction of electricity in rural communities is a pioneering subject. It must be dealt with on equally as broad principles as the lighting and power business was dealt with two—and as long as three—decades ago. Whether or not this business is handled on a small or large scale, the future must be discounted in most instances; only in a few cases will the undertaking be profitable at the outset. If extensions are made on a comparatively small scale on a business basis which considers the relationship of all investments and operating expenses, down to actual revenue, and above all with excellent service rendered in every sense of the word, some return should be realized at the end of the third year.

farmers will sign contracts at the start, but the remaining will sign up only when the line is built and in operation. You may be discouraged in the early stages of the venture as the net earning possibilities will appear to be slim, but hard work, wisdom and patience on the part of you and your organization will bring results. You must create a load that will "bring home the bacon" by displacing horse, manual and gasoline power with electric power, and then show the farmer that some real, new money lies waiting for him if he adopts some of the scientific methods that you will show him.

The farmer will have to be educated in the practical use of electricity, and your company must be the "bureau of education." This means that you will have

to study local rainfall records, climatic conditions, all about the different kinds of soil, what is best to raise, the cultivation of fruit, alfalfa, garden truck, grains, the raising of cattle, sheep and hogs and the best and most economical manner of handling these commodities. Study the preparation of different products for the market in order to get the highest selling price and go particularly into the most profitable sales methods. Most of us have created many ideas in building up our business from the "creeping" stage so that suggestions can often be made to the farmer that will make him our life-long friend. Be conscientious and by no means encourage anything that is not best for the farmer. Prepare yourself with an abundance of practical knowledge and go easy in building new lines until you have an opportunity to become familiar with the many new conditions.

Nowadays, all of us realize that, in order to interest a merchant in a modern lighting system, a manufacturing concern in changing from steam to electric power, or the housewife in using an electric range instead of a coal or wood range, in the first instance practical illuminating engineering must be used to convince; the manufacturing plant cannot be connected to our lines until the whole plant is studied and tested and the manager shown a saving in dollars and cents, and practicability, durability, convenience and reduction in cost must be proved to the average range user to have her buy it. In the farmer's case, we must adopt even broader gauged principles. Several different kinds of demonstration plants must be connected up to prove your case. Watch and test each, as from these you can gather an abundance of helpful data which is your stock in trade.

Present and Prospective Business Possibilities.

Naturally, the lighting business will be the first and easiest to obtain. Sometimes the farmer can be interested at the start in a pumping outfit for domestic and stock purposes, which also can be used for fire protection. The Kewanee system is well thought of for this kind of service. The farmer can also be interested in utility motors, operating through shafts and belts for grinding alfalfa and other feed, operating cream separators, sawing wood, churning, turning grindstones, etc.

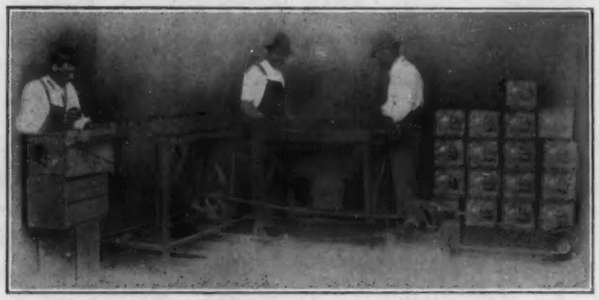
The mention of any particular make of machinery or appliance does not imply that this association or the writer recommends or guarantees such machinery or apparatus, but simply that it has been tried on the lines of the Pacific Power & Light Company and is apparently in successful operation. There are other makes that are just as good as those mentioned.

It is a well known fact that by grinding, or cutting alfalfa, its nutritive powers are greatly enhanced. It would be well for those interested to look this subject up thoroughly.

Many farmers realize that the electric incubator is a God-send. Fowls make money for the farmer, who spends it in town where we do business, and the business man spends his money with us at his place of business and home, so we produce here, as in every other instance, for everybody, both going and coming. The "Spokane Electric" and "Reed Self Regulating" incubators are the makes generally used in our territory. These types cost about $15 for the 60-egg size and $25 for one of double that capacity. Electric incubators hatch on an average of 90 eggs out of 120, while John D. Rockefeller's type only produces 67 to 70 chicks from the same number of eggs. Around Dayton and Walla Walla, Washington, many electrically heated incubators are used. This is fine business as it is a 24-hour load, running throughout the hatching period of 23 days. The more incubators used and the more hatchings from them, the greater the yearly load factor, and it is more than an entering wedge for other uses of electricity.

"Enterprise" Fruit Wiping Machine.

Like many other classes of farm machinery, the "apple wiper" uses power only a few months in the year, but builds up the load factor of the utility motor.



Electrically Driven Apple Wiping Machine.

The machines are made in Zillah, Washington, by the Enterprise Fruit Wiping Machine Co., and require one horsepower for their operation. Even though they have been on the market but two years, large numbers are being sold. With three men, 600 boxes, or one car of apples, can be wiped in one day. This machine, in other words, will save in labor the wages of seven men a day. which, at $2 a day per man, means a daily saving of $14. This big saving is secured with no damage to the fruit. One solicitor placed thirteen of these apple wipers in a month.

The cows of the Valley View Dairy Farm, Granger, Washington, are milked with a Sharples milking machine, operated by a two horsepower motor and vacuum pumping equipment. Because of the rapidly increasing population of the United States and a proportionate decrease in the number of cattle raised on account of the fact that the large ranches and other land holdings are being cut up into small tracts for intensive farming and mixed stock raising, dairying is becoming very profitable, and this business is now beginning to be conducted on a very high plane of efficiency. Probably the best incentive for real businessmen to take up this industry in the last few years is the perfecting of the mechanical milker and, now that the central stations are reaching far out into formerly isolated rural communities with their transmission lines, another strong impetus has been given this business as cheaper power for the operation of these machines can be had. From the dairyman's side of the question, he saves in labor as compared with hand milking approximately $1 per month per cow milked. Roughly, one man can, with a four-unit milking machine, milk four times as many cows as he can by hand in the same length of time.

From the central station's side of the question, you obtain a load that is guaranteed for every day in the year, and the early morning load is of especial benefit. Estimating again, every cow milked by the machine earns for the company $1.75 per year, figuring that one four-unit machine will handle a herd of 28 cows. When a salesman is endeavoring to sell an appliance, the ultimate point in view being to increase the consumption of electricity, the labor saving features of the

Milking Cows by Mechanical Means.

electricity itself are good things to be mentioned, of course, but when telling of the good points of the mechanical milker, if he mentions the fact that 75 per cent of the expense of milking is given back to the dairyman in net profits, the output of milk is cleaner and better because of the decreased number of bacteria, and the night-mare of always trying to find a reliable, cleanly, gentle and efficient man who will stay right on the job twice a day, 365 days in the year, who has a disposition so patient that he will sit quietly and gently milk a cow while she slaps her tail around his neck and places her foot in the bucket, or who will coolly sit down beside a hot cow and milk her in fly time with the thermometer 100 degrees in the shade, will be eliminated, a sale can be made eight times out of ten. The point is, don't talk technicalities; talk "sense with cents."

The electric range now, and particularly in the future, will be an inviting addition to the farmer's kitchen, because of its advantages in low cost of operation compared with high cost of fuel in most rural localities, lack of availability of gas and the many advantages known to all of you that are afforded the housewife who generally does her own work. Consequently negotiations for its installation should be started at the inception of electricity on the farm. About the only obstacle in the sale of electric ranges is the difficulty of furnishing heat economically for the hot water boiler. This can be overcome by using small coke or coal heaters that can be purchased at about $9, or a small, common heating stove may be used for this purpose. The Pacific Power & Light Company is using quite extensively the Vulcan coke heater. This heater serves its primary purpose, and in cool weather helps heat the kitchen while, in remote cases where there is an interruption to service at meal time, small quantities of food can be cooked on the auxiliary. In less than a year, we have placed in successful operation approximately 50 ranges. The Copeman type is generally sold. We find for the average sized families that the monthly cost is $2.91, with a charge of five cents per kilowatt hour and a monthly minimum of $1.50.

Washing machines, to the tune of 350, have been sold, mostly in the past year. Ninety-five of these are in and about Pomeroy, Washington. This town has a population of 1700 and we have connected 369 customers. These figures show that 25 per cent of the housewives in this community do their washing with electrically operated washing machines. In the district at Sunnyside, Washington, there are 68 of these machines in operation.

Refrigerating plants can now be purchased at such reasonable prices that a market is staring us in the face. The farmer will be quick to see the low installation cost compared with cost in natural ice belts, of installation, operation, etc., of the old-fashioned ice house. Mr. Osborne, of the Washington Water Power Company of Spokane, in his unusual activities in farm districts, is meeting with flattering results in disposing of three to six horsepower Armstrong refrigerating plants, which are made in Spokane.

Household appliances are sold much easier in the country than in the city, particularly flat irons, toasters, washing machines, etc., because of their practicability and labor-saving features, which are quickly seen by the farmer's wife, and in the case of the iron and washing machine they are especially apparent because of lack of competition of the city condition where laundries and foreigners do washing and ironing. Efforts to sell other appliances should be made the same as in the city.

The proposed line may run near a few country stores, which will always contract for lights. A mill, even when operated by hydraulic power, can be at least interested in buying power when the stream flowage is low, and in many instances at all times; especially if its equipment is badly depreciated.

School commissions can be interested to co-operate in the installation of experimental tracts for agricultural purposes, for which water is lifted by a motor-driven pump, and also in the use of heating and cooking devices in the domestic science departments of public schools. In lending help to such undertakings, education is afforded that is directly valuable to the power company and, of course, to the community. Schoolhouses with ventilating fans make good customers, and an earning can also be derived by lighting these buildings.

Railroad depots will take lights, and many times motors displace engines for water tank filling and coal elevators. Small hamlets need water. Induce them to install a plant for domestic water, which is pumped from a well. The Pacific Power & Light Company had connected this year 595 horsepower, earning about $9500 per year, in county rock crushing plants. Near Pendleton, we have two portable transformer banks that are moved along the highway, furnishing power for two crushing plants that will operate for two or three years. The county commissioners of Columbia

county, Washington, have contracted for county road-building use a few miles outside of Dayton for an electrically driven air compressor to run three-inch rock drills, besides 30 horsepower for crushing plants. In other parts of Washington, the State Highway Commission operates two crushing plants. The road-building plants afford very good business, as they operate six or seven months in the year, but entirely off lighting peaks of the summer or winter.

To most of us, the power load derived from irrigation is the nucleus of rural business.

Electrically driven pumps afford loads from a few horsepower to several hundred, which in the arid country east of the Cascades are on the distributing lines many hours each day and for the irrigation season of five or six months, being entirely off our winter peak.

To successfully exploit the use of electricity in this truly unusual power field, education is more essential than in any other branch of the power business. In most cases, the source of water supply is from wells, water being circulated from a very few feet to two hundred and more. Many times water is taken directly from an open source. The centrifugal type of pump is most commonly used. Like the presumably simple water wheel, it is the most deceiving piece of machinery made. Never assume that this docile creature can operate on any other than the specifications of head, including friction losses in pipe, quantity of water handled, speed, etc., etc., for which it is made. If you do, you invite trouble for your customers and no end of it for yourself.

As I can no more than point my finger at this great big subject because of lack of time and space, I warn you to gather all the data under which the pump is to be operated in the same careful manner you would for any piece of machinery that is to operate in your plant for the coming 20 years. The purchaser should insist on "wire to water" efficiencies that are reasonably high. If the actual efficiency, say, of a 500 gal. pump is 25 per cent, and it should be 50 per cent, the current consumption is 100 per cent too high, which means a prohibitive motor overload and high power bill. Even though rainfall is heavy, irrigation is profitable for all crops generally raised in the northwest. Eighty per cent of all irrigators will discard gasoline engines and frequently other systems of irrigation, and install motors, providing you can convince them of an actual saving in power cost and also point out the many advantages of the electric drive.

Anyone who has traveled over even small portions of our three northwestern states knows of the hundreds of thousands of acres of land that, if watered, will raise anything that grows out of doors.

This is the answer to the query about the field of irrigation power.

Undoubtedly this subject will be treated within the discussions, but before dropping it I desire to call your attention to a wonderful yet not unusual growth from raw sagebrush land to a beautiful orchard in a period of 42 months, the water having been pumped electrically at Sunnyside, Wash.

Style, and certainly the figures in a rate, are guided entirely by local conditions. Many who have dwelt upon this phase of our rural business advocate, as a type, the common flat kilowatt hour rate, because of its simplicity. True enough, simplicity should be the watchword, but the style of rate referred to is discriminatory, and, therefore, not equitable or lawful because in the case of high load factor the customer is overcharged and under opposite load conditions, the company's return is likely to be inadequate.

Fundamentally, we must be amply compensated for fixed charges, and as the farmers will give us a low annual load factor it is best to have a fixed or ready-to-serve charge. You may find that your rural power business dovetails with your annual load demands, thus helping your diversity factor. If so, you can make this fixed portion of your rate only high enough to care for the fixed expense. This can be based on maximum demand, or connected load in horsepower, kilowatts, or kilovolt amperes. Personally, I believe in connected horsepower up to a given number of horsepower—not over 25—and for the use of maximum demand in kilovolt amperes on larger

Electrically Driven Vacuum Pump for Mechanical Milker.

installations. This fixed charge has the greatest advantage because it automatically takes care of the load factor to a large degree. This is necessary because of the different types of loads and the various ways electricity is used on the farm, especially if power is used for irrigation pumping. Besides the fixed charge, the kilowatt hours consumed should be billed at a low rate, scaled down, say, in five or ten steps, based on the hours' use per day of the connected load, or the maximum demand.

A farmer can actually only afford to pay so much per acre-year for land watered in the case of irrigation, per ton or per pound for products for electricity consumed, so it behooves your power seller to produce your juice, transmit and distribute it, and be satisfied with such a reasonable profit that will effect for the farmer a saving overall kinds of animal or other mechanical power.

Flat rates have advantages to the company because of the assurance of a flat income, saving in meter investment reading same, clerical expense, avoidance of many complaints, etc. The customer likes such a rate because it deals with dollars and cents only, is uniform and the amount of bill is known

in advance; but its real popularity comes because there are no very limited restrictions on maximum demand or kilowatt hours.

Lighting.

Probably in 90 per cent of the cases, lighting rates must at least be similar in style to those the corporation charges in nearby cities or towns. Usually a higher kilowatt hour charge should be made with an increase in the monthly minimum of 25 per cent or 50 per cent.

Heating.

For heating, I suggest a rate on the flat kilowatt hour basis, with a minimum monthly charge for each range installed. The range can be on a range meter or on the regular lighting meter, which must have sufficient capacity to care for this load.

Contracts.

Because of the investment involved, I urge for the best interest of the power company and the farmer that a carefully prepared contract be entered into for all kinds of service to be rendered, particularly in the matter of power.

a. Rates.

b. Minimum charges. Payment of bills and discounts.

c. Duration, which should not be less than five and preferably ten years.

d. Specifications as to current to be furnished, such as voltage, phase, cycles, etc.

e. Power company reserves right to require customer to stay off peak, three or four hours each day, especially in the case of pumping machinery above five horsepower. And that the company assumes no responsibility for crop failures where power is furnished for irrigation pumping.

f. Lien on land for protection of power bills. This is required by our government in collection of its maintenance charges.

g. Right-of-way over customer's property.

Above all, avoid as far as possible using technical terms. Talk dollars and cents and be very conservative in your figures, whether engineering or financial.

Soliciting.

Without doubt, it is within the power of the solicitor to make a failure or success of the rural district undertaking. Even if he should have a thorough knowledge of each of the many uses of electricity in this new field, the business-getter must have a personality that will take with those who make their living from Mother Earth; also be possessed with diplomacy 99 per cent fine. Most folks want something they cannot have. So take advantage of this trait in psychology and insist that the lines will not be constructed until the necessary amount of business is contracted.

Soliciting in outlying districts is necessarily expensive because of the high-grade assistants required, cost of livery and auto hire, living expense when the representative is away from home, and the time and patience required in negotiating with the farmer. In this same connection, much expense can be avoided if the representative of farm and pump machinery concerns, and in some instances those selling motors and other electrical machinery, can travel together, but great care must be exercised in that the purchaser understands that the power company is in no way responsible for machinery it does not sell. I believe the power company should not sell apparatus other than electrical. In fact, that policy seems to prevail with most companies now in the rural district field. Local conditions, though, may alter such a policy. The central station must become interested in determining proper machinery and its installation. This will require much study, especially in connection with pumping machinery. "By-guess-and-by-God" methods tend to cause failure to your farm undertakings. Much valuable information is set up in data books of motor builders, pump companies, etc., all of which must be studied and referred to by those endeavoring to interest the farmer in using electricity.

As a guide in exploiting this kind of business, I suggest that the cost of installing distributing lines, transformers and meters be equal to only twice the amount of estimated annual earnings from contracted business, and certainly that the ratio of earning to this construction cost be greater than 3 to 1, or for every hundred dollars spent, there should be a gross earning of, say, thirty-five dollars per annum.

Line Construction.

Both transmission and distribution systems must be constructed at the lowest possible cost, but high enough to avoid too large a maintenance and depreciation charge. Already established transmission lines play a big part in keeping down investment for such new construction, as they can be tapped by out-of-door type transformers, or, if need be, connected to indoor type transforming apparatus. Furthermore, the transmission poles can be advantageously used for distributing circuits. When new lines are to be set up, where possible advantage should be taken of the economy effected by the farmers' co-operating with you in furnishing teams and labor in drawing material, digging holes, etc. Many times, they will furnish cedar poles cut from nearby woods. While it is not advisable to use too short poles and those having tops and other cross-section dimensions below our standards, shorter timber than would be used for similar service in city limits can be set. Long spans greatly cut down pole, erection and equipment costs. Two-hundred foot spacing is permissible if due regard is given to pole strength, wire sagging, guying, etc. As 6600 volts, and sometimes 12,000 volts, are used for distribution, iron and copper-clad wire can be put up with great economy. It is advisable to use copper-clad wire for long spans because of its tensile strength. If the former is used, the future load possibilities must be carefully analyzed to avoid the expense of taking down this wire and putting in its stead copper for increased capacity. Main, and a great many times branch, single-phase distributing lines will satisfactorily serve rural community. Such a system brings a pronounced reduction in line and transformer investment. It is well to construct lines with the view of changing to three-phase should demands increase beyond expectation.

Capital for building lines into a territory lacking revenue producing powers is sometimes furnished by the state, county or town, or the individuals who propose using electricity. This money can be paid by returning monthly 25 per cent of the revenue derived from this line. (a)

Note—(a) You are referred to the Technical Section paper read at the Chicago convention this year, entitled "Switching Apparatus for Rural Installations."

Operating Policies.

Service in every sense of the word spells success or failure of your business dealing with the farmer. Keeping current on the lines at all times is essential especially if the motor is a part of an irrigation pumping plant, because in dry weather acres of products can be ruined by lack of water. Furthermore the farmer necessarily handles perishable goods and, if power is used in preparing it for the market, it must be as reliable as in the case of a factory having a big payroll. Voltage tests must be made regularly, particularly where long secondaries are run. The frequency must be kept constant for in the operation of pumping machinery speed characteristics affect the pumping results by supplying too much or too little water.

Each plant must be visited frequently in order to keep all machinery running properly, the farmer instructed in its care, economical operation, etc. A record should be made at the time of each call to ascertain the cardinal features, dealing with operating methods on the farm that directly or otherwise affect results, the farmer's costs as far as they can be obtained and results from sale of products grown. This, and all other data gathered, should be studied, one form compared with another and statistics prepared with a view of helping the farmer get better results, and your own education, as well as getting new business. The national and state governments, universities and our associations are continually getting out valuable information for the farmer. Gather this data for the mutual benefit of the farmer and the employes of your concern. Interest the farmer in keeping records and boiling them down to unit costs. To determine efficiencies and capacities of all kinds of farm machinery, make complete tests with indicating and recording meters when requested, and of your own volition. In reading meters, following up troubles and making repairs, the farmer should have every consideration in the way of dispatch, courtesy and patience that is given the city customer, even though it does cost considerble money for the first few years of operation. Bear in mind that you are establishing principles for a new business in a new community, so I urge that collection principles be laid down at the outset that are businesslike and that they be lived up to. If the charges are just and reasonable, there should be no reason why bills should not be paid. If they are not, it means an expense that must be unjustly paid by the "prompt payers." If any company is financially able to carry the farmer along during his development period, it of course will result in getting much load that would be slow in coming on the lines otherwise.

This new field for power, light and heating loads, will produce directly:

1. Increased earning per capita.
2. Improvement in load and diversity of production and transmission, and distribution machinery and apparatus.
3. Higher efficiency in operating force.
4. A greater net revenue per kilowatt of station capacity.
5. Last and best, a higher net divisible earning.

Indirectly, rural activity produces what Geo. Arrowsmith terms a "community factor," meaning briefly that, for all that our industry creates in outlying districts, feeds to the towns and cities we now serve, a revenue part of which accrues to us from the bigger and better city we have materially aided in building.

Prepare for the new era of the electric light and power industry which has unparalleled possibilities for the whole territory you now and will serve, and to your company great and unthought of results.

We owe a service to the northwest, and mankind in general, to operate the empire that Hill and Harriman worked so hard to build up.

MUNICIPAL OWNERSHIP.

BY R. B. MATEER.

[The author gives a concise account of some of the reasons leading up to municipal ownership, which he describes as "a protest to the abuse of public confidence."—The Editor.]

With municipal ownership of all public utilities, water, light, railway and power not now a spectre, and each year becoming more of a reality, by reason of public demand, it is only fair that the owners of all quasi public conveniences give some attention to the causes of such a sentiment as is voiced in the adoption by ballot of laws obligating a community to the payment of principal and interest on such funds as are used either to parallel existing systems or to purchase the property real and apparent of such utilities as are now protected by franchise rights. The first implies the wanton waste of capital, the second generally results in the acquisition of a "gold brick," a property covered with mortgages secured only by inefficient machinery and rather ancient distribution systems of the patchwork variety; excepting, however, those utilities that are the result of an honest effort on the part of aggressive private capital to break the shackles of a combination—a one man power, exercised generally to the detriment of the consumer and the enrichment of his own purse. A few of the most flagrant reasons for municipal ownership are here stated:

Consolidation. Competitive companies to supply neeessities such as power, light and water, or transportation, for territories inadequately served, are formed. Generating machinery is purchased, distribution systems are erected, equipment only of the modern type is placed in operation. Under an aggressive and efficient management, not only the interest and fixed charges are earned, but a surplus is acquired—"Service" is the keynote. The increased earnings are the result of reasonable charges for service meriting the co-operation of the consuming public. Under such conditions, "Ownership by a City" ceases to be a slogan for political advancement. Rate regulation by council or commission is sufficient, until the financial interest of one corporation acquires the control of its competitor, effecting a gigantic consolidation which implies not only the re-financing sufficient to cover existing securities, but the absorption of all the surplus. Such a consolidation places upon the ultimate consumer added burden. As it is the public who must pay the bill, is it surprising that the acquirement of all utilities by a municipality becomes again a burning issue?

Excessive Charges. Consider, if you please, the development of a territory from a desert to a tropical garden possible by the use of such conveniences as transportation, electricity for light, fuel and power purposes. Such necessities may be had, but those interested in the reclamation of desert land must pay the price. The ultimatum is, advance the most of construction, guar-

antee a satisfactory interest on the investment, and service is available. Is it remarkable that other sources of fuel are sought, that isolated generating equipment is ordered, that communities install and operate apparatus necessary to supply the service refused by private corporation? Such a policy is but a boost for municipal ownership.

Manipulation. Again, if you please, consider the message flashed over the wires by the manipulator of quasi public utilities to the patient, conscientious operator of the local light and power company interested only in good service: "Shut down on all extension work. Reduce your operating expenses to a minimum. Conserve all resources." Such a communication is received with dismay; its enforcement is far-reaching. Fear grips the public. Small sums, the reward of honest labor, are withdrawn from circulation and locked in vaults, handicapping business and throttling legitimate investment. Money is spoken of as "tight." The excuse is at hand for high interest rates; values fall. Securities at a low figure are snatched up by the manipulator. Unearned profits are tucked away and the cause for unrest is accomplished. The panic, the implement used by those out for pecuniary gains, is not forgotten; those who have suffered seek refuge in a plea for the municipal ownership of all utilities, as a curb over those whose dominition of public conveniences and greed for wealth inspires financial unrest.

Promotion Piracy. Last, but not least of the contributing causes for municipal ownership, is the greed of the banker who finances competitive light and power companies, not from a desire to benefit the consumer, but solely to benefit his own pocket. Instances of such policies and their success are not rare. They are worked each year. Equipment is installed, the long hour, profitable business of the established company is sought, by offering "bargain rates" and long term contracts, hoping that the curtailment of revenue will force a remunerative offer. Piracy is an appropriate name for the means used to accomplish their purpose. The effect of such promotion is far-reaching, in that it educates the public to a false minimum value of such conveniences as are retailed by public utilities.

Muncipal ownership is but a protest to the abuse of public confidence by those whose training and affiliations should benefit not destroy. Eliminate the promoter, the manipulator, the wrecker and the greedy financier from the control of quasi public utilities, placing their operation in the hands of an honest management, and good service, at a minimum of cost, is guaranteed to a community. Protection on his investment is assured to the stockholder and co-operation accorded the capitalist in financing legitimate propositions.

Long distance runs by electrics are of more and more frequent occurrence. This should serve to check the tendency to aver that the electric is good only for short hauls. A regular stock car was driven from Boston to Springfield and from Springfield to Holyoke and return, a total distance of 114.7 miles on one charge of the battery. The car was equipped with 54 A-6 Edison cells, having a rated capacity of 225 amp. hr. The trip is still more notable as several very difficult hills had to be negotiated. The round-trip between Washington and Baltimore is 82 miles, and this trip, over very bad roads, was made by an electric truck carrying a load of 1200 pounds. With the recent remarkable improvement in battery construction there is no reason why these performances should not be excelled and the electric soon find a much larger field than it at present holds.

THE PERMANENCY OF UNDERGROUND WATER SUPPLIES WITH INCREASED PUMPING.

BY CHARLES H. LEE.

[The determination of the permanency of underground water supplies is of great importance as the interests at stake are too large to wait for the supply to fail, instead of conserving because of accurate knowledge, especially in view of the fact that to readily secure such information is quite practicable and at reasonable cost. Mr. Charles H. Lee is a civil and hydraulic engineer with offices at 934 Union Oil Bldg., Los Angeles, Cal.—The Editor.]

That the underground water supplies are limited is a fact which experience and scientific investigation has established beyond a doubt. The unlimited extension of pumping observed throughout California today therefore cannot necessarily be considered as permanent. In fact, in some districts the future will see the abandonment of many pumping plants now in operation.

In view of these facts is it not good business for large commercial enterprises to know the permanency of subterranean water supplies, upon which they depend for profit? Take, for instance, the hydroelectric project developing a pumping load. Is it not as wise a business precaution to know how much ground water there is annually to be handled in a given district as it is to know the amount of water that can be depended upon at the water-wheels? No modern hydroelectric development is undertaken without thorough preliminary investigation of the stream flow. But what business manager actively engaged in building up a pumping load can say when he has gone far enough? Is is not a short-sighted policy which would invest capital and build up business without first knowing what are the physical limits of that business?

Suggestions of this kind are usually dismissed without ceremony on the ground of impracticability. It is commonly held that the only way to test out underground water supplies is to develop them until they fail. The time has now arrived, however, when the interests at stake are becoming too great to proceed blindly. Fortunately the necessity of proceeding without definite knowledge no longer exists. Scientific investigation of recent years has shown conclusively not only that rate of supply of underground water can be accurately measured, but that this measurement can be accomplished with reasonable cost. The argument of impracticability can therefore no longer be advanced.

The United States Geological Survey has been the most active agency in this work of gathering and correlating underground water data. As early as 1900, the great importance of such information was recognized by Mr. J. B. Lippincott, then resident hydrographer for the Survey in this State. Under his direction water plane measurements were made in several important ground water districts, and preliminary plans were formed for broad extension of such work. The final development and execution of these plans was accomplished by Mr. W. C. Mendenhall, who was actively engaged on field work in Southern California during the years 1903, 1904 and 1905. His reports,

appearing as water supply papers of the Geological Survey, are remarkable for their broad constructive view of the physical situation and their simple clear presentation of a little understood subject. The essence of Mendenhall's observations can be stated in the following manner: The commercial ground waters of California occupy the voids around the particles of gravel and sand filling the closed rock basins represented by the topographic valleys. Each of these basins is a subterranean reservoir for ground water whose supply is water absorbed from flowing streams which debouch from mountain canyons and from direct precipitation.

The next step in advance was made during the years 1908 to 1911 through work carried on by the Los Angeles Aqueduct in co-operation with the United States Geological Survey. The upper portion of the aqueduct passes through the Independence basin, a typical underground reservoir of large capacity situated in Owens Valley. The water supply possibilities of this basin were early recognized by aqueduct officials. In order to ascertain the available supply with some degree of precision, the unique idea of actuably measuring inflow and outflow was proposed by Mr. William Mulholland, Chief Engineer. The writer was placed in charge of the work and carried it to a successful conclusion. The practical value of the plan was recognized by the Geological Survey, and at the suggestion of Mr. Mendenhall funds were allotted to assist the aqueduct in completing the studies. The necessary data involved not only ordinary hydrographic and meteorologic measurements, but the pioneer investigation of such subjects as seepage losses from streams and soil evaporation. The assembled data has not only furnished the information desired by the aqueduct officials, but is also proving a precedent for the solution of similar problems throughout California and the whole Southwest.

Briefly stated, these intensive studies developed and proved the following principles relative to the underground reservoir. First, the natural ground water outlet is within the basin at the region of lowest depression and consists of overflow from springs and seepages into surface channels, evaporation from damp soils and vegetation, and in some cases underflow through definite channels. Second, the average annual rate of recharge by absorption of stream flow and precipitation equals the aggregate ground water loss. In other words, the reservoir formed by porous materials filling a closed rock basin gives up as much water as it receives. This is of course self-evident by comparison with a surface reservoir in an impervious basin.

The data upon which these conclusions are based included extended measurements of all the elements making up both inflow and outflow. These elements consisted of precipitation, seepage losses from streams, return water and evaporation losses from irrigation, flow of springs, soil evaporation, transpiration and other processes. All such information can be obtained by simple engineering methods and involves little expensive equipment. In fact, in many cases results of sufficient accuracy for practical use can be obtained by a few days' work with a transit and soil auger.

The application of these broad principles to practical pumping problems is a simple matter. Pumping or artesian flow consists of extracting water from an underground reservoir by artificial methods. The artificial removal of water from a basin must of necessity reduce the amount escaping by natural channels. As long as the amount permanently extracted, together with ground water escaping through natural outlets, does not exceed the amount of water absorbed, no dangerous situation arises. If, however, water is pumped so heavily that the storage is drawn upon from year to year, then draft exceeds supply. Such a condition cannot be remedied by lowering pumps and putting down more wells. The only remedy is reduced pumping.

Such is the present status of our knowledge of ground water conditions in the existing and prospective pumping districts of California, and of the whole Southwest.

The practical value of these ideas to the business operations of hydroelectric power projects is very great. The majority of such enterprises market a considerable portion of their power in the centers of population and in so doing must transmit long distances through sparsely settled territory. The advantage of building up business in this intermediate region is becoming more and more apparent. A most desirable type of load to be here developed is pumping for irrigation. This is almost entirely a day load and greatly improves conditions on a system carrying a lighting and urban transportation load.

Power companies throughout the State are now beginning to encourage in every way possible the use of electric power in pumping. There is danger, however, in overdoing such efforts. The possibility of overdraft upon underground supplies is not as impossible as is commonly believed. From the writer's own observations he has knowledge of valleys which are being recklessly overpumped. There have also come to his attention new sparsely settled districts for which the ground-water supply is pitifully inadequate for the irrigation of even a small portion of the agricultural land where expensive transformer stations and distributing systems are already installed for delivering power to the prospective settler. Such situations as these which already exist should be an effectual warning against overconfidence.

Hydroelectric power enterprises with their large and ever increasing capital investments can ill afford to be uninformed regarding the underground water situation in districts adjacent to their lines. Upon the permanence of the water supply for irrigation depends not only the market for power consumed in pumping, but also of that used in local lighting, transportation and miscellaneous farm operations. Farming cannot be carried on without water. Neither can small country towns exist without agricultural industries. Without population there is no demand for light or transportation. Hence there are definite vital reasons for possessing the fullest possible knowledge of underground water conditions.

The usefulness of such information is by no means limited to the curtailment of overdevelopment. There is another feature of underground water to which it

applies with even greater practical result, namely, the conservation and increase of subterranean supplies. There is a wide field here for the practical application of intelligently gathered data and the benefits to be derived are both increased business and insurance against trouble in times of drought. It must be remembered that extensive pumping has only occurred during the last few years, and the effect of protracted drought has not been experienced. There is no doubt, however, but that serious situations will arise in many districts under drought conditions which could be largely prevented by taking proper precautions during years of plenty.

The methods of conserving and increasing ground water supply will be but briefly described as the subject is a large one. Conservation, or the prevention of loss, may be accomplished by reducing, as far as possible waste in artificial development and losses through natural channels. Under the first item may be mentioned the common practice of allowing artesian wells to flow unchecked when not in use. This has been declared a misdemeanor by the state legislature, punishable by fine or imprisonment, but through adverse local sentiment the law is seldom enforced. The remedy is by the education of public opinion to recognize the evils of the practice. Another possible source of waste is in transmission of water to the point of use and in unintelligent irrigation. In a wide-awake community, however, such situations usually cure themselves through self-interest.

The elimination of loss through natural channels, such as evaporation from cienaga or swamp lands, is a more difficult problem. That such losses are large has been fully demonstrated not only by the Owens Valley experiments, but by agricultural investigators both in the United States and Europe. The depth of water evaporating from moist soil and meadow areas in many cases exceeds that which would occur from a bare water surface. The enormous volume of water which escapes into the atmosphere from a swamp area of several square miles, which is of quite common occurrence, is therefore evident. The remedy for this condition is by lowering the ground water plane within the area of moist land. There are several ways of accomplishing this. The one to be adopted depends on the local conditions. Pumping is involved in almost any plan, however, and it is here that the most reliable ground water supplies are to be obtained.

The increase of ground water available for pumping is to be accomplished by bringing about greater absorption of surface water by the gravels. The source of water most available for this purpose is winter flood water, which, under natural conditions, would be lost into the ocean. The storage of such water in underground reservoirs is preferable to that in surface reservoirs. In the first place there is no expensive dam and transmission system to build and maintain. Furthermore, the capacity and extent of most subterranean basins is large, and water absorbed around the rim consumes months, and even years. in reaching the region of outlet. During this period the water is protected from loss and contamination. On the other hand, water stored in a surface reservoir during a similar period would suffer severe loss by evaporation and possibly become fouled with vegetable growths. The underground reservoir is therefore far more effective in bringing about over-year storage than is surface storage. Greater absorption of flood water is thus desirable both by accomplishing greater conservation of surface supply and by providing insurance against failure of ground water supply during periods of drought.

The general method of artificial subterranean storage is to bring the water in contact with the porous gravels. This may be done either by broadcast spreading over the surface, by diversion into basins, or by diversion into shafts and pits. Each method has special features which makes it adaptable to particular local situations. The cost of such work on Santa Ana River, in Southern California, where effective work is being done, has been ridiculously low, compared with the value of the water stored. Although the feasibility of power enterprises engaging in such work might not be evident, yet there is no question but that in many districts subterranean storage of flood waters would be to their benefit.

With these statements relative to the practical value of knowledge of local ground water conditions, the writer will outline a general plan for the intelligent gathering and use of such data. There are two situations which present themselves. First, the management of a proposed or existing project is desirous of roughly ascertaining the desirability and amount of the maximum reliable pumping load of a new district. This involves a rough preliminary investigation, which can usually be made in a few days by an engineer experienced in applying the methods which have been previously described. The results of such an investigation would in most cases be sufficiently reliable to determine the approximate dependable load in the district and its desirability as a field of operation.

The other situation is that of an operating company definitely planning to enter, or already established, in a district. Such a company should desire definite knowledge of the permanent yield of underground water to be obtained from the district, the possibilities and methods of conserving and increasing the supply, and the exact relation of ground water supply and demand at regular future intervals. This information involves a more extended and detailed study. This the experienced engineer could plan and carry on with the help of one or more technical assistants. The work in connection with keeping a progressive record of ground water conditions could well be done by company employees under the supervision of the engineer.

A detailed study of this kind would consist of (1) the tracing out on the ground of the boundaries of each separate underground reservoir and a study of the geologic formations; (2) the locating of existing wells with all obtainable data, including the log; (3) the determination of the position of the water table throughout the basin from well measurements; (4) determination and measurement of natural ground water losses; (5) if possible, checking ground water losses by accretions; (6) making observations neces-

sary to formulate plans for the greatest conservation and artificial increase of ground water supply. The data needed for watching the condition of the supply are measurements of depth to water in wells, records of the amount of water developed from the basin during stated periods, and information regarding new wells. The time spent on detailed ground water studies should, of course, be proportionate to the importance of the supply and the extent of the company's business within the basin.

In conclusion it can be said that underground water supplies are a permanent natural resource as long as they are not drawn upon too heavily. The extent to which they may be safely used in any district can in most cases be determined with reasonable accuracy and cost. Self-interest and good business principles should lead hydroelectric power companies to obtain and be guided by expert opinion, based on accurate data when formulating business policies regarding the sale of power for pumping.

IMPORTANT POWER HEARING AT DENVER.

Right of Federal Government to Interfere With Power Developments on Public Lands Involved.

A suit in equity of the United States against the Utah Power & Light Company, successors to the Telluride Power Company, is being argued before the United States circuit court of appeals at Denver.

The Department of Agriculture regards this case as the most important that has come before the courts in years affecting public lands, and similar interest is shown in it by the representatives of the power companies. Upon the favorable interpretation of the law by the courts in this case depends an immense revenue to the federal government, as well as the establishment of the government's right to control public lands used by power companies for the development of hydroelectric energy.

The government contends that the power companies that locate on public lands since 1896 must do so under permission from the secretary of the interior; and that, unless they have that permission, their presence on the land is wrongful—and particularly their presence on national forest lands. If the government is successful in the present case, the power companies will have nothing except the permissive right to build flumes and construct reservoirs in national forests or on other public lands. If the companies are successful, the decision will virtually give the power companies a vested right in the reservoir sites and the right-of-way of the flumes, by the act of 1866.

The present case involves a reservoir site of about fifteen acres and right of way for about a mile and one-half of flume in Logan canyon, Cache county. The Telluride Power Company, predecessor of the Utah Power & Light Company, went on the land in question in 1900. The site was placed within the confines of the Cache national forest in 1905.

The government bases its claim to control of the lands on which the plant is located under an act of Congress passed in 1896, which provides that the secretary of the interior may give permission to hydroelectric power companies to place reservoirs and flumes on power sites in public lands. Under this law, particularly in national forests, a rental is usually charged by the government, the rate of which varies with the importance of the plant so located.

On the other hand, the Utah Power & Light Company, and with it other power companies of the west, claim that their right to go on the public land is based on an act of Congress passed in 1866, which made provisions for companies to obtain rights on public lands for sites for manufacturing purposes.

The two important contentions of the government are that under the act of 1896 it is the duty of the power company to obtain permission to establish its reservoir and flumes from the secretary of the interior; and that the act of 1866 was passed prior to the time when hydroelectric power plants were known as commercial enterprises. The act itself provides that the companies could obtain rights for flumes and reservoirs for manufacturing purposes, and the government contends that "manufacturing purposes" cannot be held to cover hydroelectric plants, because such were unknown at that time.

The government will argue that provisions of the act of 1866, so far as they relate to hydroelectric plants, are impliedly repealed, at least in substance, by the act of 1896, which refers to the latter specifically; or if not so repealed that the act of 1896 establishes an exception, and at least its provisions are the controlling rules in such cases.

A similar ruling, it is stated, to this contention, has been already made by the government in a case affecting reservoir rights on the Rio Grande river, where the court held that the law of 1896 was controlling.

The case was, however, decided adversely by the district court in Utah last June, and the government appealed, resulting in this new hearing.

The first threshing machine, so far as is known, operated by electric power in Idaho, was installed in the Hagerman valley this season. D. Dilatush threshed all of his grain this year with an electric outfit, and the Vader ranch has installed a motor for running their thresher. The electric drive is a complete success, and appealed to the farmers in view of the fact that there was no smoke or danger of fire.

The electric vehicle is steadily gaining in popularity. This is evidenced by recent statistics of some of the larger cities. In New York there are now 498 electric pleasure cars and 1,700 electric trucks; in Chicago, 2,200 pleasure cars and 630 trucks; in Washington, D. C., 654 electric pleasure cars and 255 commercial trucks; in Boston, 282 passenger cars and 261 commercial; and in Denver, 850 pleasure cars and 37 trucks.

Electric Truck Performance.—At the conclusion of the California State Fair the exhibit of the Edison Storage Battery Supply Company was loaded on a one ton truck built at San Leandro, Cal., and equipped with Edison batteries. The load aggregated 1,600 lb. and was carried from Sacramento to San Francisco, via Stockton, Livermore and the Dublin Hill Road. This is the first electric on record to have made the trip as stated and those interested in the building and equipment of the truck are naturally elated over the performance.

EDISON DAY.

Thirty-four years, and there are still those who persist in the statement that "electric lighting is but in its infancy." Rather it has reached the maturity of its Carbon Age and as it passes, someone hurriedly suggests that its genius be honored.

The carbon lamp is dimming and will soon be burned out.

There are anniversaries which are especially observed every five, ten, twenty-five, fifty, or one hundred years, but it is probable that none other than Thos. A. Edison could have thrust upon him a special

Thos. A. Edison and His Friend, Dr. Chas. P. Steinmetz.

anniversary during the thirty-fourth year of the life of the incandescent carbon filament lamp which he made possible. But the decree has gone forth. October 21, 1913, is Edison day and all should be glad that for once, an opportunity is afforded us to honor the inventor.

Purpose, patience and persistence make performance possible.

There are few who can appreciate the difficulties of those pioneers who endeavored to perfect a small electric lamp which would operate successfully while using a sub-divided current, from mains supplied by crude dynamos, "the rattle and throb of which made the ground shake beneath one's feet."

Starr of Cincinnati invented in 1844 a lamp which anticipated in many ways the carbon filament lamp which was later perfected by Thos. A. Edison. This was actually a race of many brains toward the practicable and the great credit is due the Wizard of Menlo Park in that he stuck to his purpose in spite of opposite scientific thought of that day which affirmed that commercial lighting with small sized electric lamps was not practicable.

To accomplish the "impossible" makes man immortal.

Thos. A. Edison produced his first lamps and placed them in actual use. To the enthusiast it matters not who accomplishes the "impossible" provided the thing is done. Mr. Edison undoubtedly pays tribute to contemporary investigators and willingly shares the honors of accomplishment with his faithful assistants without whose co-operation the days of accomplishment would certainly have been delayed.

His was a Herculean task, so let us honor him while we may; not that the passing of this great invention will prevent our doing this in the future also, but it is well that we too fully awaken to our opportunity.

Kings and kingdoms have their birth, reach maturity, and pass away; a need is seen, a genius expressed, and his work, too, passes; in hamlet, city, and mart, everywhere, the individual does his part,—contributes to the genius of the day,—and this makes history and marks a nation's greatness. Let us each do our part.

Some of the very earliest Edison lamps were used on the Pacific, being installed on the steamship Columbia, one of the first vessels to be equipped with an incandescent electric lighting system. The lamps were of the carbonized paper filament type, gave sixteen candle power, and consumed about one hundred watts each; as efficiency of less than fifty per cent that of the present day carbon filament lamp.

The so-called metalized carbon filament lamp, the metal filament lamp,—the tantalum, and tungsten and finally the Mazda lamp, each with its increasing efficiency, have now brought us to a place where we are able to obtain six times the amount of light as that given by the early Edison lamps for an equal consumption of current.

The joy of creative effort and the impulse of self-expression leave their impress on the times.

While the prices of other commodities have increased, the cost of electric light to the consumer has steadily decreased. In a large measure, invention is responsible for this very desirable condition which is at the same time a rebuke to those responsible for the high prices of other commodities. We pay for losses occasioned by ignorance and indolence and when we as a race overcome our mental laziness we shall enjoy greater comfort and convenience and the cost of living will be no longer high.

Viewed rightly obstacles disclose opportunity and opposition is found to aid.

Those of us who had no schooling and so "never had a chance," were weaklings or discouraged early in our efforts might well read the history of Mr. Edison's achievements for inspiration and encouragement and as a check to our excuses.

Thos. A. Edison is an example to us to make good. Let us stop to honor him on this thirty-fourth anniversary of his greatest invention.

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Safety Calls For Action

There is an inclination to ridicule and rail against the cumbersomeness of big corporations, so slowly they sometimes move. Although not absolving the corporation in any way for its neglect, it would be indeed interesting to puzzle out just who would be to blame had an accident occurred on the railroad where twelve months after having been instructed by a State commission to install a needed protective device, no action had been taken either by the corporation or the commission.

We may go black in the face passing resolutions, burst the covers endeavoring to contain the rapidly added laws, but none of this will benefit the people unless the resolutions are carried out and the laws enforced.

Under such circumstances, twelve months is an age untold, and the man on the street may well mutter.

Hours should be the limit for the installation of protective devices ordered by a State commission, and during the time which must elapse before the device is permanently installed, satisfactory temporary precautions should be taken. A commission appointed through the power of the people and acting in their behalf is equally responsible to them, hence the difficulty in puzzling out just who would be to blame should an accident have occurred under the stated circumstances.

The powers of such a commission are not only perceptive but regulative, and the necessary protective regulation should follow immediately the need is perceived.

The Farm Servant

In European countries it is not unusual to hear of life-long servants who work on the farm for a pittance; poor, yet faithful and reliable; tireless, too, until Death gathers them,—they are retainers rather than servants, father and son each occupying the same job in succession.

But in a country teeming with opportunity for all, labor is not so constant toward the employing famer. There are no ties of sentiment, and too often the farmhand but holds his job until he finds something better. This class of labor, restless as quicksilver, is the same as that employed on large construction work on which there are always three full gangs—one gang going, one working on the job, and one coming. It left a tired farmer reaching out after a servant at once tireless, reliable, constant and low-priced.

The one suggestion better than that of the real estate man who advises that you "Follow the Trolley," is "Anticipate it," and this, in many instances, was done by the farmer, although not always intentionally. The invariable accompaniment to the network of trolley lines aggressively woven throughout our western lands is the central station power lines which press out even farther, and it was from these that the farmers' help was to come.

These power wires found the farmer eager to employ, for electricity proved for him to be the tireless, reliable, cheap and constant servant he had searched so diligently to find.

But it is true, too, that they profit most who serve best and while power companies usually discounted the future in making rural extensions, electric power on the farm proved so popular and found so many applications that the load has almost immediately proven profitable. Due to business resulting from rural extensions some Western central stations have reversed the usual order and point, perhaps with pardonable pride, to an annual peak which occurs in the summertime.

Elsewhere in this issue is information of importance to the central station regarding the introduction and use of "the tireless farmer" which electricity now is and a news item of moment marking another stage, Electrical Threshing, in the development of this important new field.

The telephone and interurban car have destroyed the farmers' isolation, motors have provided reliable servants at the hour and season required, the farmer's wife enjoys a house electrical with all the comfort, convenience and cheeriness, that circumstance contains, and so removing everything undesirable from life on the farm, the power of electricity beckons irresistibly, "back to the land."

Underground Water Supply

Swiftly the rope passed through our hands in boyhood days, as the oaken bucket raced down to lift cool water to a thirsty lad. We drank our fill with never a thought whence it came; whenever we wanted it down went the bucket and always returned filled to the brim. There was enough and to spare. Then came the pump and we found further uses for the stream which poured forth; we gave the stock well-water then, instead of taking them down to the pond. 'Twas easier. Followed the aermotor with its tank which kept an up-to-date system in the house supplied, besides our previous wants, and truck garden and lawn drew their measure also. We had found new uses.

Right to our door then came the central station man with his wires and the power pump was installed. We enjoyed this service, for the chores were easier. More home acres were brought under cultivation, more stock added, for all we had to do was throw in the switch and so much water came we were inclined to waste it. Then one especially dry season things happened contrary to expectations. First the water came just as it did from the old oaken bucket, clear as crystal; soon it came clouded, then too thick to drink, and soon afterwards we found we were pumping sand. We raved at the central station man and blamed him for the failure of our supply and with his usual good grace he assured us that we must sink the well deeper and so tap larger reservoirs. This done, he repacked the plunger, fixed the valves and set the pump going again. There were plenty of opportunities presented to us to waste water but after this experience we discontinued the abuse of our supply.

With the rapid settlement of the land in parts where irrigation is essential this boyhood reminiscence will have its application and value. To the central station man building a distribution system to care for this business and with capacity for the great future which his mind's eye pictures, and basing his expenditures upon carefully prepared estimates of possible business, there comes the revelation that there is still one item which can and ought to be investigated that these estimates may prove still more reliable. It is an investigation the results of which will still further improve central station service and remove all doubt as to the possibility of the discontinuance of that business through failure of water supply.

The man who buys and the man who sells also may each be in a quandary, for it is essential that they too, know exactly the amount of water available for the permanent irrigation of the tract. More important to such districts than all precipitation and temperature records, surveys and soil analysis reports, is this question of the permanency of underground water supply, and a very necessary protective and educational function of government should be carried out in the compilation of reports giving accurate data on this important subject, which might also be used as a basis for a new conservation.

In other columns of this issue appears an article bearing upon this subject, which should prove of great interest to every reader—so closely are we all related to the success of the soil.

Dynamite and the Suffering

The power of ignorance to appal is latterly most apparent. Crazed by the abuses of others, weaklings aim to destroy the thing abused. Colossal engineering feats convey to them no sense of the required service which erected and maintains them.

Neither is it to be expected that they know just what they do, for even the most ignorant of men, the most prejudiced against capital, those who hate most the thing they think oppresses, are kind when it comes to caring for the sick and suffering.

In our large cities, accidents are of frequent occurrence and sickness also causes suffering and in the care and alleviation of these, central station power is largely used. The destruction of a plant or transmission line, placing the central station out of commission, inflicts a hardship upon those injured or incapacitated by sickness at that time. Unkindness is not a trait of the workingman and a realization of the suffering alone caused by the destruction of central station property should make men pause and seek out a juster way.

Uneasy lies the head responsible for the continued operation of central station power plants.

There are others injured also by hindrance, delay and loss; those who can ill afford it. Who knows too the mission of the human freight carried by our trolley cars and halted because of interrupted service. Have a care, workingmen of the west, or your unintentional injuries will arouse antagonistic public opinion to injure you the most.

Trade disputes can be satisfactorily settled only by dispassionate understanding based upon exact knowledge. The fever of force fails ever and the fight is won by co-operation of the cool and calm.

PERSONALS

ITEMS FOR THIS DEPARTMENT ARE SOLICITED FROM ALL READERS

Geo. Anderson, civil and hydraulic engineer of Denver is at San Francisco.

Geo, Peirce, manager Santa Monica Bay Home Telephone Company, is at San Francisco.

G. L. Jacobs, representing C. L. Cory, is at Los Angeles on professional business.

J. G. Pomeroy has opened offices in the San Fernando Building, Los Angeles, as manufacturers' agent.

F. L. Kinsey will in future have charge of advertising for the Bridgeport Brass Company, Bridgeport, Conn.

B. M. Smarr, illuminating engineer, General Electric Company, San Francisco, has returned from the East.

Jack Duhan, Montana Electric Company, Butte, Mont, has been apointed manager to succeed the late **R. C. Kemp.**

H. A. Greene, formerly advertising manager Bridgeport Brass Company, is now located at the company's New York office.

E. C. Jones, chief gas engineer, Pacific Gas & Electric Company, attended the American Gas Institute Convention at Richmond, Va.

F. W. Gay, mechanical engineer, and **Geo. F. Chellis,** electrical engineer, J. G. White Engineering Corporation, were at Bakersfield last week.

J. W. Van Huysen, district manager of the General Electric Company, located at Fresno, Cal., was a visitor to San Francisco during the week.

Geo. M. Robinson, engineer Board of Underwriters of Pacific Coast, is attending the Municipal Fire Protection Association Convention at Philadelphia.

P. D. Kline, general manager, Ogden Rapid Transit Company, attended the annual convention of the American Electric Railway Association at Atlantic City.

Geo. Culbert, in charge of the stock records department of the Pacific States Electric Company, San Francisco, left on his honeymoon trip the early part of the week.

Jos. L. Bradfield, supervising engineer, National X-Ray Reflector Company, is at San Francisco and before returning to Seattle will make a business trip throughout southern California.

H. S. Clark, of Westinghouse, Church, Kerr Company, San Francisco, left for the East recently where he will attend the railway convention and will also visit the various manufacturing centers.

Geo. Hewins, general superintendent of construction, J. G. White Engineering Corporation, has returned to San Francisco, having completed a tour of inspection of the company's construction work.

Simon Bamberger, president of the Salt Lake & Ogden Railroad, who is now making an extended tour in the east, will attend the Atlantic City convention of the American Electric Railway Association.

Joseph S. Wells, general manager, **Will Browne,** auditor, and **F. E. Hansen,** claims adjuster of the Utah Light & Railway Company, attended the American Electric Railway Association Convention at Atlantic City.

D. D. Morgan is at the Crocker Street Hospital, Los Angeles, recovering from a rather serious accident encountered while returning by automobile from the Big Creek plant of the Pacific Light & Power Corporation.

C. L. Winston, chief engineer, Kellogg Switchboard Company, arrived in San Francisco, but would not talk shop. This is a honeymoon trip and Mr. and Mrs. Winston are returning to Chicago via British Columbia and the Canadian Pacific Railway.

R. D. Cleavenger, popular salesman of the Phoenix Glass Company, is at San Francisco and is sending out advance pos-

Guess?

tals as above reproduced, announcing his visit to other coast cities. To date, the postals have not been excluded from the mails.

T. N. Gilmore, engineer in the construction department of Westinghouse, Church, Kerr Company, and temporarily located at Vancouver, B. C., where his company has large construction work in progress, was a recent visitor in San Francisco.

R. B. Clapp, formerly with the sales department of Westinghouse Electric & Manufacturing Company, Los Angeles, has resigned from that concern to become associated with the sales department of the West Sacramento Land Company. Mr. Clapp will continue to reside in the southern city.

James F. Rogan, at one time connected with the old Los Angeles Electric Vehicle Company, is agent in that city for the Edison Storage Battery Supply Company. Mr. Rogan has had a large experience in the automobile business and is well known and extremely popular among the automobile and electrical fraternity.

John C. Jones, local manager Westinghouse Electric & Mfg. Co., Salt Lake, has left on a visit to the Westinghouse factory and works at East Pittsburgh. While east he will attend the American Electric Railway convention. **L. M. Cargo,** district manager for the intermountain country, with headquarters at Denver, will take charge of the Salt Lake office during Mr. Jones' absence.

MEETING NOTICES.

Portland Electrical Contractors' Association.

This association held their regular meeting at the Portland Commercial Club at 6:30 p. m. Wednesday, October 8, 1913. Refreshments were served.

Joint Pole Committee, Portland.

This committee has met and organized. The following officers were elected: Chairman, C. B. Coldwell; vice-chairman, H. R. Wakeman; secretary, W. T. Herron.

San Francisco Electrical Development League.

The league met at Tait's Cafe, and held a business meeting. There was considerable discussion of matters of interest to the League, the most important outcome being that it was decided to publish a bulletin for distribution, on the Uses of Electricity.

Los Angeles Jovian Electrical League.

A. K. Mohler, railway engineer of the board of public utilities, discussed the Union Station plans at the last Jovian lunch. Mr. Mohler is opposed to the construction of the proposed depot on the Arcade site, chiefly from the standpoint of the inadequacy of plans presented for providing for future development.

Sons of Jove, Los Angeles.

The Jovians will hold another rejuvenation at the Union League Club, on Monday evening, October 13, 1913. The degree team is comprised of the following: Jupiter, J. G. Pomeroy; Pluto, T. E. Burger; Mars, A. L. Spring; Neptune, H. B. Lynch; Vulcan, J. E. Macdonald; Hercules, K. E. Van Kuren; Apollo, H. K. Fish; Mercury, J. N. Colkitt; Avrenim, P. C. Ensley.

Los Angeles Section, A. I. E. E.

Ernst M. Schmelz is to present a paper on "Electric Steel Furnaces" before the Los Angeles Section of the American Institute of Electrical Engineers, on Tuesday evening, October 21, 1913. Mr. Schmelz is erecting a steel furnace for the Warman Steel Company at Redondo Beach, which has contracted with the Southern California Edison Company for furnishing power. The plant is expected to be in operation in a few days and will, for the present, turn out high-grade steel castings.

Oregon Society of Engineers.

Regular monthly meetings have been resumed. A large and enthusiastic attendance marked the opening meeting addressed by President Foster of Reed College, who chose for his subject "Ultimately Practical Education," emphasizing especially the necessity for character building. The discussion showed that those present considered that if the student is aiming toward a finished course leading to the highest degree his work should be that which would broaden and lead to the use of initiative, while the practical engineer who is to execute the plans of the former does not need to be so extensively schooled.

Utah Electric Club, Salt Lake City.

At the regular luncheon Joseph R. Murdock, president Utah Lake & Irrigation Company, gave a talk on the subject of "Reclaiming the Arid Lands of Salt Lake Valley by Electricity." He outlined the plans of his company wherby they are pumping water from Utah Lake with electrically operated centrifugal pumps into a canal 100 ft. above the lake level. From this point the canal runs north through a fertile tract of land on the west side of Salt Lake valley, bringing under irrigation of 15,000 acres of land. Their plans contemplate the installation of additional units and another canal at a 200 ft. elevation, which will irrigate as much more land as the present one.

A musical program was furnished during the luncheon under the direction of Mr. Fred C. Graham.

Portland A. I. E. E. and N. E. L. A.

Eighty-nine members of the local sections of the American Institute of Electrical Engineers and the National Electric Light Association motored to the automobile grounds on the Sandy River where the first of a series of joint meetings of these societies was held. E. H. West, chairman of the local N. E. L. A. section, was chairman of the joint meeting.

J. E. Davidson directed attention to the advantages offered by these societies to young engineers and predicted that at no far distant date, Western branches of all national societies would split from the parent associations and form a new organization for the reason that the problems of the East and West differ so materially. Although the cost of publication of transactions of national bodies is prohibitive, they do not contain much data of interest to the West and the division would distribute the cost more fairly.

Franklin T. Griffith gave an address on the operation of public utilities and their relation to the public. He contended that the day had passed when a public utility could be operated as a private enterprise, as the public was in partnership —a silent partner that must be considered in all its dealings. He believed that as the years roll around there would be a better feeling created btween th public and th utilities.

E. F. West urged the older members, especially those holding Fellowships, to be more regular in their attendance at meetings. This was the only way to prove worthy membership. The inaugural meeting was a great success.

JOVIAN REJUVENATION AT LOS ANGELES.

The third rejuvenation under the regime of Statesman R. B. Clapp, was recorded on Monday evening last at the Union League Club. The usual dinner preceded the rejuvenation. J. G. Pomeroy acted as toastmaster, and was successful in making almost everybody either talk a little or tell a story. The several courses were interspersed with singing—socalled —and this would have been very enjoyable had it not been for Johnny Morris and the rest of the "We sting house" bunch singing off key. The serious end of the program was directly in charge of J. N. Colkitt, Alternate Statesman, and was carried through very smoothly, the degree team being of a very high order. The following candidates were admitted: James F. Rogan, A. H. Rees, H. E. Thornburgh, J. H. Fenton, H. C. Barnes, H. J. Horne Jr., J. Harry Pieper, H. W. Harrison, Lorne M. Meyer, John Glasstitter, Chas. Ohlson and W. S. Johnson.

TRADE NOTES.

Removal of the Stewart-Fuller Company office to room 2, 121 Second street, from Stevenson street, is announced. It is not anticipated that the excellent service of this company will be interrupted in the slightest due to this removal.

Ne Page, McKinny & Company, have been awarded the complete electrical installation contract for the new Pantages Theatre being erected for Alex. Pantages at Victoria, B. C., the contract amounting to approximately $8000. Jesse M. Warren, Victoria, B. C., is the architect for the building.

The Cutler Hammer Manufacturing Company, Milwaukee, has recently opened a new district office in Cincinnati in the Fourth National Bank Building. Horace L. Dawson, formerly of the engineering department and latterly one of the sales engineers connected with the Chicago office, will be in charge.

NEW CATALOGUES.

Tregoning Electric Manufacturing Company, Cleveland, Ohio, have issued Bulletin No. 5, which consists of several loose leaf pages listing Tregoning specialties—rosettes, shadeholders, receptacles and plugs.

A pamphlet on Flexible Steel Armored Conductors has been issued by the Sprague Works of the General Electric Company, which gives a short history of electric wiring and information regarding "BX" Cable.

Sprague Electric Works of General Electric Company, are distributing Bulletin No. 850 on Industrial Ozonators These ozonators may be used for ventilation and air purification, for the purification of water and for many industrial purposes.

The Ohio Brass Company, Mansfield, Ohio., are mailing a folder describing the National Railroad Trolley Guard designed for protection against accidents at grade crossings. Holabird-Reynolds Company, San Francisco, and R. D. Holabird, Los Angeles, are agents.

Bulletin A4115, entitled "Electricity on the Farm," issued by the General Electric Company constitutes an exhaustive treatise on this important subject and covers lighting for the farm, the uses of electricity in the farm home, and the advantages of electric drive. Applications of motors are profusely illustrated and accompanied by practical suggestions, together with cost comparisons of electrical equipment with other forms of power. This section of the bulletin also covers the use of electric vehicles on the farm. Irrigation is dealt with in detail, and tables are included showing the conditions encountered and describing equipments and methods of applying water in both the arid and humid regions.

The bulletin contains statistical information of a practical nature to the farmer, the central station manager, or the sales agent, and should prove of unusual interest to all those engaged in the extension of electrical service on the farm.

THE STATE OF CALIFORNIA WORKMEN'S COMPENSATION ACT.

BY J. R. MOLONY.

[Continued.]

I want to say a word with reference to the position of the insurance companies in regard to this particular bill and the whole subject. Two years ago, at the time the Roseberry Law was proposed and being considered, I sent out letters to all policyholders of our company in the state of California and some additional employers, numbering, I believe, approximately five thousand. In these letters we called attention to the very drastic change in the method of treatment of industrial accidents; pointed out that with the passage of the Roseberry law would certainly come a very marked increased cost to employers in dealing with this phase of their business. You will probably be surprised to know that we received three responses to these letters, it being quite apparent that the employing interests either paid very little attention to what we had to say or else were so little interested in the subject that they failed entirely to read our communications. Our object in sending these letters was not to oppose the theory of compensation but to call attention to this proposed change so that the employers might express their approval or disapproval of it.

Subsequent to the passage of that law and upon the announcement of the increased rates to cover an employer's responsibility under it, we were criticised severely for not having protected the employers' interests. With this experience in view and notwithstanding our efforts to put them on notice, we felt that with the Boynton Act and its extremely drastic provisions, it was necessary that we go on record in opposition to such parts of that bill as seemed unreasonable under the circumstances and to do our utmost to bring home to the employers an appreciation of what this bill meant in its application to their business. It was with this in mind that we sent out the literature from our office, which was undoubtedly received by your members. I presume all of you gentlemen know of the stand taken by the Aetna Life Insurance Company and I believe you will agree with me that it was a proper one.

However, having made our fight against the obnoxious features of this bill, we feel that it is incumbent upon us to point out quite forcibly at this time the necessity for cooperation upon the part of the employers, employes, state authorities and insurance carriers if this bill is to succeed in any sense of the word or if undue hardships upon the employing interests are to be avoided in the administration of it. There is no doubt but that the state authorities, without assistance from the employers and insurance companies, will be utterly helpless in endeavoring to minimize the abuses which must necessarily follow in the wake of this bill from a standpoint of exaggeration of disability by injured employes and assimilation of injuries by that same class. These two abuses in claims administration have reached a point in magnitude in the continental systems where it is questionable whether they can be successfully curtailed. If this is not done, the cost of those plans and the cost of this plan will at some day in the near future, reach a prohibitive figure beyond which it cannot be permitted to go and allow the industries of this state or other countries to live. There is no one element so well qualified to assist in holding down this cost as the employers themselves and this should be thoroughly appreciated by your own body.

In addition to this it is going to be highly essential that you inform yourselves with reference to the inspection part of this Act, which will be mentioned more in detail later. Unless you have a thorough knowledge of the requirements of this part of the Act and the power which is vested in the inspection bureau of the state, there is little question but that you will experience a great many difficulties in the conduct of your business. To my mind it is essential at this time that you learn definitely what your own obligations are and what your own rights are under this bill, so that you may not come in conflict with those interested in the administration of this Act, than it is important to go into the question of cost. Competition between insurance carriers will insure you the lowest possible cost but this competition cannot entirely take off your shoulders some of the responsibilities with which you are certain to be faced under this Act. If I can arouse sufficient interest among your members to insure the devotion of some little time to this question, I will have accomplished all that I hoped to today.

Taking up the text of the Act itself, briefly, it falls into four natural divisions. The first part of the Act, as well as the last few sections, is given over to the organization of the Industrial Accident Board, the determination of the powers of that board, and the defining of the methods of procedure under it. The second part of it is devoted to a definition of the compensation benefits payable to employes for industrial injuries and the determination of their amounts and the fixing of the responsibility for payment on the employers, irrespective of the theory of negligence. The third part of the act creates a state insurance fund to be operated upon a theoretically fair, competitive basis with other insurance carriers, provides for the organization of that fund, its management and its method of doing business, and places the entire organization under the control and direction of the Industrial Accident Board, without placing any personal responsibility upon that board for the fulfillment of its obligations. The fourth part of the act creates a safety and accident prevention bureau, definies its powers, places it under the jurisdiction and management of the Industrial Accident Board and determines the employer's responsibility with reference to the question of safety of all industrial plants, provides penalties for the violation of the obligations imposed and the manner of inflicting these penalties.

Taking up the first part of the bill, or the organization of the Industrial Accident Board, it is to be composed of three men with salaries of $5000 each, who are to have full and complete jurisdiction over the administration of all claims arising out of industrial accidents occurring in the State of California and sustained within the course of a man's employment. This board is to have original jurisdiction in all such cases and its findings, so far as the facts are concerned, are to be final. A limited review of its findings otherwise, is permitted by the Appellate courts, but there is no recourse in the event of an improper finding of fact, as it is specifically stated in the bill that all findings of this board are to be conclusively presumed to be lawful and reasonable.

In addition to having this authority over all claims arising out of industrial accidents, they are made the managers of the state insurance fund, with the same power and control as the board of directors of any private institution, which includes the appointment of all employes and the fixing of the salaries and term of office of such employes. They are then put in control of the inspection department, with equal powers over it.

The compensation benefits provided by this act are matters concerning which no insurance carrier is interested from its own personal viewpoint. We have continually pointed out, however, to our policyholders and to all employers in California, that these benefits are higher than those provided in a number of Eastern acts and the question so far as these amounts are concerned, is not one of insurance but one of finance, and it rests solely with the people of California to determine whether the industries of the state can afford to bear the burden. As this question has been determined by the legislature, there seems to be no room for argument.

Our criticism of the schedule of compensation benefits does not at this time extend to the amounts of compensation granted, but rather to the method of determining those

amounts. An entirely new theory is adopted whereby the amounts of compensation to be awarded are to be graded in proportion to the degree of disability sustained by the injured on all permanent disability cases. That is to say, if a man suffers an injury permanent in character, disabling him to the extent of 10 per cent of his earning capacity, he is to receive a sum equivalent to 65 per cent of his wage for a period of forty weeks, this being graduated up to a point where 60 per cent disability is suffered, in which event the compensation is to be 65 per cent of the weekly wage for a period of two hundred and forty weeks. Beyond that amount of disability a man is to receive 65 per cent of his wages for two hundred and forty weeks and a pension for life, which, added to his earning capacity, will give him an income equivalent to 40 per cent of his average annual earnings at the time of the accident. That is to say, if a man should suffer a disability of 70 per cent, his benefit would be 65 per cent of his wages for two hundred and forty weeks and 10 per cent thereafter for life. This 10 per cent added to his earning capacity of 30 per cent will give him, as you will see, an income equal to 40 per cent of his earnings.

There are no rules laid down in this act for the determination of the degree of disability, and out of this will arise innumerable difficulties in administration, much bad feeling between employer and employe, and a very material increase in the cost of operation, unless it is judiciously administered and the utmost care taken to hold down the degree of disability to a proper figure. In other words, you will readily see that if a man is permitted to exaggerate his disability from 10 per cent to 20 per cent and thereby receive 65 per cent of his wages for eighty weeks instead of forty, it will result in just double the cost on that injury, and if this is carried out consistently it will mean a cost to an employer, whether insured or uninsured, which will be absolutely prohibitive.

On temporary disabilities, not permanent in character, the injured is to receive 65 per cent of his loss in wages beyond the first two weeks of disability, the amounts of payments under these temporary disabilities to be limited to three years' wages, but not to extend beyond two hundred and forty weeks. In addition to these benefits, of course, the employer is to provide full medical, surgical and hospital treatment, including nursing, medicines, medical and surgical supplies and appurtenances, for a period of ninety days subsequent to the date of the accident, which is to be unlimited so far as the amount is concerned.

The death benefit is limited to an amount equivalent to three years' wages, or where no dependents are left, reasonable funeral benefits not exceeding $100 and "such further death benefit as may be provided by law." In this connection it is interesting to know that the bill which was introduced and passed by the legislature at the request of the Industrial Accident Board, which required the employer to pay a death benefit where a man died leaving no dependent, into the state industrial accident prevention fund, was vetoed by our progressive governor. So far as I know, this the first and only instance in the history of this legislation in which any legislature was ever prevailed upon to require the payment of damages in a case where a man left no one dependent upon him.

There is one other matter I believe should be called to your attention in connection with these benefits which you are required to pay for industrial accidents, and that is, where an accident is caused by the employer's gross negligence or wilful misconduct, the injured employe may maintain, independently of this act, an action at law for damages in which he may recover whatever amount a jury may see fit to award him, and I wish to state here that these actions cannot be insured against, as the law specifically states in Section 35-B, that no such contract shall be valid.

The administration of these benefits will prove exceedingly difficult on account of the fact that the law provides in Section 32-B that no release of liability or settlement agreement shall be valid unless it provides for the full compensation in accordance with the provisions of this act or until and unless it shall be approved by the commission. As I have stated, the findings of fact rest solely in the hands of the Industrial Accident Commission, and on account of the many details in the act itself, it will be extremely difficult to determine when a compromise fulfills all obligations under this act. Consequently, in my opinion, a very large number of cases will have to be submitted to the board for decision before any valid settlement can be had, and this certainly will not add to the dispatch of business under this act nor hasten the recoveries of injured employes.

Taking up the insurance fund, there is little, I believe, which needs be said except that while it is claimed that competition by this fund with private mutual companies and private stock companies will be fair, it is not fair at the outset nor in my opinion can it ever be made fair. They are asking and have received all manner of subsidies which they were unwilling to forego in a discussion prior to the adoption of this act and it seems to me that this fact itself is indicative of fear upon their part that the administration will neither be economical nor efficient, otherwise how can they justify requests for subsidies out of the pockets of the general taxpayers of this state.

So far as the advisability of anyone insuring in this institution, in my opinion it would be necessary for those who wish to purchase insurance to buy unlimited contracts, otherwise they have only partially relieved themselves of responsibility, and in the event of a catastrophe, many employers will certainly face insolvency with limited insurance. I believe it will occur to you immediately that if unlimited contracts are to be issued covering all sorts of hazards, that a guarantee fund of $100,000, such as is provided this fund with which to commence operations, is a ridiculously small amount of surplus for the protection of policyholders. Usually careful buyers of insurance always look askance at any private institution with no larger fund than that between its policyholders and insolvency, and I believe there is little in the past administration of public institutions in the United States which would justify us in looking with favor upon the administration of a scheme such as this with no more guarantee of solvency back of it than this institution has. It undoubtedly will be claimed by the proponents of this bill that the credit of the state of California is back of this so-called "State Institution," but I want to call your attention to Section 36, page 23, of the printed copies of this act, which reads: "There is hereby created and established a fund to be known as the 'State Compensation Fund' * * * without liability on the part of the state beyond the amount of said fund." It is apparent from the wording of this act that the intent of the legislature, clearly expressed, is that there shall be no state guarantee back of this fund. This was clearly stated and clearly understood by the legislature that passed this act and no claims to the effect that the state's credit is behind this fund can carry any more weight than a statement that future legislatures in this state may possibly be willing to continue this experiment at a cost to the tax-payers at a later date, and if you have any fear that a legislature might be elected at some time which would decline to continue this socialistic experiment, then you must admit that this fund must stand on its own feet with $100,000 to guarantee it. It is quite apparent that this fund should present all the undesirable elements of state administration with no responsibility attaching to any of its administrators, with no financial credit so far as the state of California is concerned, behind it, with all of the difficulties of administration which usually follow in the wake of state activities and with nothing to recommend it except the possibility of its furnishing a cheap article of insurance to buyers of insurance in the state of California, which undoubtedly will be as cheap in protection as it is in price.

[To be continued.]

INDUSTRIAL

A NEW MOTOR DRIVE FOR INTERTYPE AND LINOTYPE MACHINES.

Every printer appreciates the necessity of overcoming annoyance and loss of time caused by the transposition of intertype and linotype matrices during composition. Such trouble is the invariable result of irregularities in the driving speed, due either to belt slippage with the line shaft drive, or to insufficient power or poor speed regulation with direct motor drive. The Cline-Westinghouse drive can be applied to any intertype or linotype machine in a few minutes' time and without special work. These motors have ample power to keep the speed steady at all times, even at the "break away" of the mold, and are very strong and rugged in constuction with heavy shafts and large bearings which are automatically lubricated by oil rings. The commutator and brushes of the direct current motor are of excellent construction, resulting in long life and freedom from repairs. A cover, further protects the commutator from accidental damage. Alternating current motors have neither commutators nor brushes and therefore have no parts that require attention other than the bearings.

Means of adjustment between the gear and the motor pinion are provided for in this drive so that accurate alignment is assured. The standard outfit is designed to drive the machine at the speed recommended by the manufacturer, but a larger pinion can be supplied for obtaining a higher speed if desired.

Motors are suitable for operation on any ordinary lighting circuit of standard characteristics.

BENJAMIN OUTLET BOX LIGHTING UNIT FOR STREET RAILWAY AND INTERURBAN CARS.

A new lighting unit of interest to electric railway men has been placed upon the market by the Benjamin Electric Mfg. Company, Rialto Building, San Francisco. It consists of a special cast iron outlet box tapped for either ½ in. or ¾ in. conduit, a mogul screw base porcelain receptacle, with lamp grip which prevents the loosening and falling of lamps, and mica washers attached to the bottom of receptacle after wiring connections have been made. The box is further supplied with metal cover overhanging the edge and covering the receptacle and lamp base. The former is so mounted that the binding screws are accessible through the open end.

This new unit is especially adapted for series lighting on circuits ranging from 500 to 1200 volts where film cut-out for street series work is not desired. Where the use of medium screw base lamps is contemplated it is furnished with a two-piece porcelain receptacle for this purpose.

DIESEL ENGINE.

The Dow Pump & Diesel Company, San Francisco, have completed a four cycle, three cylinder type, 150 h.p., 250 r.p.m. Diesel engine directly connected to a Crocker-Wheeler d.c. generator which is carrying the full load of their Alameda plant where it was built. The first test was of 168 hours' duration, during which the consumption is stated to have been less than .61 bbl. oil per b.h.p. at half load, Star oil being used. This oil has been a drug on the market and is supplied in such large quantities by the oil companies that it is available at all times. A sale of 2,500,000 barrels was made last month at 50c per barrel.

The load was fluctuating, varying from 70 kw. to 100 kw. but the speed of the engine was constant (240 r.p.m.) The engine functioned perfectly during the test, no attention whatever being necessary for the fuel, lubrication, or speed regulation. Since the completion of this test the engine has been running regularly during the day and carries the entire load of the shops.

TRANSFORMERS FOR MANHOLES.

Manholes and underground chambers are usually damp and quite frequently are flooded, so that it often becomes necessary for the transformer to continue in service while partly or wholly submerged in water. A transformer for such service must therefore be water and air-tight. The joints between the case and cover, as well as those where the leads issue from the case, must be of such construction as to prevent any possibility of moisture entering the case.

On account of the poor ventilation in manholes, and the resultant fairly high temperature, transformers must have low temperature rise, and due to the limited space available for installation and handling, they must be compact but at the same time rugged in design.

Transformers used in such service are usually connected to the mains continuously, consequently it is essential that the iron loss be as low as is possible.

The type SM transformers made by the Westinghouse Electric & Manufacturing Company, East Pittsburg, Pa., have been designed with these requirements in view.

Up to and including 50 k.v.a. capacity, type SM manhole transformers are similar in construction, with the exception of the case, outlet bushings, and low-tension terminals, to that of the well-known Westinghouse type S transformers.

The design of the 75 and 100-k.v.a. transformers is somewhat modified to enable the transformer to pass through the usual standard manholes.

Type SM manhole transformers up to and including 50 k.v.a. capacity are enclosed in cast-iron cases, the larges sizes of which are corrugated to facilitate the radiation of heat. The 75 and 100-k.v.a. capacities are mounted in sheet-iron tanks welded by the oxy-acetylene blow pipe process with the top and bottom castings cast on.

Since these transformers are made air-tight, internal pressures are developed due to the expansion of the air and oil, caused by an increase in the temperature. The air space between the oil level and the cover, however, forms an effective cushion for taking care of the expansion of air and oil.

A further precaution is usually provided by mounting on each transformer a safety device for relieving any abnormal increase in pressure.

The bushings furnished with these transformers not only prevent moisture entering the case, but are so designed that it is possible to connect and disconnect the transformer very readily. As the space in the manhole is usually quite limited, this feature is of advantage. The leads are brought from the coils through a heavy porcelain bushing and terminate in leaf connectors. Connection is made to the line by inserting the leaves of a similar connector to the lead-covered cable and tightening a bolt which is inserted in a hole passing through all the leaves. A brass sleeve with an insulating lining is slipped over the connection and screwed into the transformer case. The lead casing of the cable is connected to a flanged sleeve by a plumber's wiped joint. A nut is used to force this sleeve to a seat on the gasket in the outlet bushing, making a perfectly water-tight joint. This construction affords a most satisfactory method of connection, enabling same to be made in the limited space of the manhole without disturbing the transformer in any way, at the same time securing good contact by means of the bolt and leaf connection.

NEWS NOTES

FINANCIAL.

SAN FRANCISCO, CAL.—The railroad commission has granted authority to the Amador Electric Light & Power Company to issue $12,000 of bonds to retire indebtedness, and to issue 3000 shares of capital stock.

GLENDORA, CAL.—The board of trustees has sold the $25,000 municipal water bonds to Torrence Marshall & Company for par value, accrued interest and a premium of $26. The trustees have purchased 10 acres of water bearing land for the purpose of water development, and they will let contracts at once for sinking wells and for casing and other needed supplies.

VISALIA, CAL.—The September financial report of the Central California Gas Company, which was sent to the state railroad commission this week, shows a remarkable increase in business over a year ago. President Chas. S. S. Forney accounts for this by the fact that the reduced rates now in effect are getting more business. Gas is now sold here at $1.25 per thousand feet.

ILLUMINATION.

SOUTH BEND, WASH.—Chas. Fuqua, representing H. W. Urquhart of Chehalis and John Stewart of Seattle, has asked for a franchise for a gas company to be capitalized at $75,000.

BAKERSFIELD, CAL.—The new 6000 k.v.a. turbo generator at the San Joaquin Light & Power Company plant, was started up last week and has now been put into service.

LOS ANGELES, CAL.—Plans and specifications for a lighting system in Moneta lighting district have been adopted by the board of supervisors and the county clerk instructed to advertise for bids for the same.

COVINA, CAL.—The board of trustees has awarded a contract for the installation and equipment of a lighting system in Center street, from First to Hollenbeck streets, to the Newberry-Bendheim Electric Company, for $3,974.

FRESNO, CAL.—The 1530 ft. head pipe line for the Tule River plant of the San Joaquin Light & Power Company, has commenced to arrive and is being erected. The water wheels and generators manufactured by the Allis-Chalmers Company, are also en route. The J. G. White Engineering Corporation, are the consulting engineers.

PORTLAND, ORE.—The City Commission has awarded a contract to the Portland Railway, Light & Power Company for the lighting of streets and public buildings for three years, commencing January 1, 1914. The company submitted the lowest bids for this service ever received by the city, and it is expected that approximately $60,000 will be saved.

SAN FRANCISCO, CAL.—The railroad commission has granted authority to A. A. Weber to sell to the Alta District Gas Company, a gas plant serving the cities of Dinuba and Reedley, and authorizing the gas company to operate under franchises from the counties of Tulare and Fresno. The company was also given authority to issue its promissory notes in the sum of $20,000.

RAYMOND, WASH.—Two petitions for gas franchises in this city were presented at the city council last week in addition to the one submitted two weeks ago by Urquhart & Stewart. After due consideration to all of them, the city council finally passed the franchise sought by H. W. Urquhart, of Chehalis, and John Stewart of Seattle. Under the terms of this franchise construction must commence within eight months and must be completed within 18 months.

BAKERSFIELD, CAL.—For the purpose of insuring a steady and sufficient pressure on the main which carries natural gas from the Buena Vista Hills to Los Angeles, the Midway Gas Company is constructing a $75,000 compressor plant about five miles from Taft. Several centrifugal pumps, each capable of passing 2000 gallons of water per minute, will handle the vast amount of water required to force the gas through the lines. At present water for the concrete work and for use in camp is brought through 18,000 ft. of pipe from the Western Water Company's plant. To operate the compressor plant 200,000 gallons will be needed daily, and the company is preparing to develop its own water. Two rigs are up and one well is drilling.

LODI, CAL.—It is reported that T. P. Wickershaw, president of the Western States Gas & Electric Company, is negotiating for the purchase of the local gas plant. At present the city of Lodi is planning to buy the plant for a municipal gas system. The plant is owned by the Sacramento Natural Gas Company, which wishes to dispose of it and is willing to give the city of Lodi the first chance to purchase. The board of city trustees will take up the matter at an early date and if the proposition is a favorable one, will submit it to the voters.

TRANSPORTATION.

SAN DIEGO, CAL.—Plans have been filed for a big concrete barn for the San Diego Electric Company. It will be erected on Adams street, just beyond Mission Cliff gardens.

LOS ANGELES, CAL.—The city council has taken steps toward acquiring a new depot on the Arcade site. A resolution has been passed, instructing the city attorney to draw up the necessary contracts for the track changes.

RIVERSIDE, CALIFORNIA.—Erle L. Veuve has completed the appraisal of the Crescent City Railway system, between Riverside and Crestmore. This line is now being extended to Rialto, where connection will be had with the Pacific Electric Railway. Riverside citizens expect to get direct electric railway service by this route to Los Angeles upon completion of this link.

LOS ANGELES, CAL.—A special committee of the city council has made overtures to the Pacific Electric Company to have them defer for one year the payment of $247,000 on the contract price for the municipal railway, in order that this amount may be applied to harbor development. It has been suggested that the railway company accept the amount in harbor bonds, at par, in lieu of the payment in cash. This matter is now under consideration.

IDAHO FALLS, IDAHO.—An interurban electric railroad of forty-two miles, with Idaho Falls as headquarters, will be constructed and completed within the next twelve months. The conditions imposed by the eastern promoters that the citizens of Idaho Falls subscribe for stock to the amount of $1000 per mile have been carried out. The money has been subscribed and the bonds, amounting to $1,500,000, have been sold to Chicago parties. It is said that work will commence within the next ten days on the grade.

ORANGE, CAL.—The Pacific Electric Railway Company has started work on the Santa Ana-Orange electrification. Orange is now served by a narrow gauge gasoline car of rather limited capacity. The car body is one of the Los Angeles cable cars of the early nineties, equipped with an automobile engine taken from one of the first gasoline sightseeing automobiles brought to Southern California. The new line is over private right of way, between Santa Ana and Orange, leaving the Santa Ana line on Main street, north of Santiago Creek and entering Orange at La Veta avenue and Lemon street.

SAN BERNARDINO, CAL.—The Pacific Electric Railway Company is making rapid headway with the Upland-San Bernardino extension. Tracks have been laid on First street, west to the Atchison, Topeka & Santa Fe Railway. From this point, the electric line will be elevated as far as what is known as the Lytle Creek bench. This necessitates some particularly heavy construction in concrete and steel. There is a prospect of a reduction of fares and running time between Los Angeles and San Bernardino on the steam roads to meet the competition of the electric line.

SACRAMENTO, CAL.—The Sacramento Valley Electric has been surveyed from Red Bluff to Woodland, and the survey was extended to Dixon and a point 7 or 8 miles from that city to connect with the Oakland, Antioch & Eastern, with which traffic arrangements have been made. Recently a survey was made from a point near Dixon to Solano City. The company has had excellent success in obtaining rights of way, many miles having been donated by the landowners. It is estimated that over 80 per cent of the rights of way have been obtained. C. L. Donohoe, president of the Sacramento Valley Electric railroad, stated that the company is now in a position to begin construction, and that bids for the grading of the first unit of the road will be asked.

TRANSMISSION.

MARTINEZ, CAL.—Work will begin soon on a new substation at Avon. The new station will be 60,000 volts and will prove a feeder for the local lines in the event of accident which would place the south tower out of commission.

LOS ANGELES, CAL.—The recently appointed efficiency bureau of the city council has recommended that the fire alarm system be turned over to the department of electricity, from which it was withdrawn several years ago.

BOISE, IDAHO.—The Idaho Power & Light Company, organized under the laws of Nevada, has taken over the holdings of the Beaver River Power Company in Boise and Southern Idaho, together with all its franchises, worth approximately $1,000,000.

ALAMEDA, CAL.—The electricity department is now engaged in installing a heavy power line along the Webster street roadway to the factory district. The enlargement of the facilities at the plant have caused the extension of lines for power business in the day time.

OROVILLE, CAL.—A syndicate of Sacramento capitalists has filed an appropriation upon the waters of the middle fork of the Feather River and upon Fall River. Included in the company are F. G. Eby, S. H. Whisner and L. F. Breuner. The appropriation recites that the water is to be used for the purpose of generating electrical power and that the estimated production of the plant is 60,000 h.p.

MOUNT PLEASANT, UTAH.—The city council has completed the purchase of the local electric light company's holdings in this city and is now in charge of the operation of the plant. The purchase price was $15,000. The city is rapidly bringing its power plant in Pleasant Creek canyon to completion, and as soon as it is running the plant in town, purchased of the private company, will be closed down.

STOCKTON, CAL.—The Oro Electric Corporation has installed continuous electric service in all of the territory served by their wires, and is now prepared to furnish electric lights in addition to power. This has been made possible by an arrangement entered with the Pacific Gas & Electric Company, and approved by the State Railroad Commission, whereby the Oro Company secures its power from the older company.

VISALIA, CAL.—The Mt. Whitney Power & Electric Company, which derives 70 per cent of its revenue from pumping plants, for irrigation in the San Joaquin Valley, shows unusual earning power during the month of August. The gross earnings were $54,028 and the balance after all expenses including $9875 interest on bonds was $19,625 as against $9572 in the same month last year. For the year ended August 31st the net balance over all expenses was $159,437 compared with $132,164 for the same period in 1912.

RENO, NEV.—A water power permit has been granted the Truckee River General Electric Company, under which this company will develop power in the El Dorado national forest. The company states it expects to construct seven reservoirs, five for water storage and two for equalizing the flow. The two power plants mentioned in the permit are to be located on Pilot Creek. At each there will be a head of approximately 1300 ft. The company expects to make an initial installation which will develop 16,000 h.p., which will probably be doubled as the market for the product increases.

TELEPHONE AND TELEGRAPH.

VENICE, CAL.—Sealed bids will be received up to October 27th, at the office of the board of trustees for a franchise granting the right to construct and maintain telephone and telegraph wires along the streets of Venice.

PORTLAND, ORE.—The Pacific Telephone & Telegraph Company has made an appropriation of $55,000 to meet the cost of the conduit on Oak street, between Front and Park, according to an announcement made by Manager Fred Spoerl. The conduit is for additional cables to meet the expansion of 1913. They also have an estimate amounting to $60,000 to rebuild 23 miles of the toll lead between Salem and Aurora junction.

SAN FRANCISCO, CAL.—The California Railroad Commission has rendered a decision in which it directs the Pacific Telephone & Telegraph Company to reduce its rate for telephone service in the city of San Jose and neighboring territory. The reduction ordered is 50c per month on unlimited business and residence service and 25c per month on two-party residence service. The commission estimated the total reduction at $15,000 annually. The commission declares that the policy of the company to require an advanced deposit for telephone service is improper and must be discontinued. The commission makes special objection to heavy payments to the parent company, the American Telephone & Telegraph company.

WATERWORKS.

ENDICOTT, WASH.—The contract for the water system has been awarded to C. Cochran for $10,992.

TACOMA, WASH.—An ordinance has been passed providing for the construction of watermains of 6 in. cast iron pipe, and all necessary work in connection, at an estimated cost of $17,621.

SAWTELLE, CAL.—Sealed bids will be received at the office of the city clerk of Sawtelle, up to November 17th, for a franchise to construct and maintain for a period of 25 years, a system of water pipes along and across certain streets, alleys and thoroughfares in the city of Sawtelle, Cal.

TAFT, CAL.—Although the general opinion of many has been that the Western Water Company's lines were complete throughout the West Side fields, the increase in the demand for water from its wells 17 miles from Taft has necessitated the contracting for material for another line to the Sunset field to cost in the neighborhood of $65,000.

SAN DIEGO, CAL.—W. G. Henshaw of San Francisco, representing a New York syndicate, has offered a proposition to the city council to develop and supply the city of San Diego by March, 1915, a minimum of 20,000,000 gallons of San Luis Rey River water at 12c per 1000 gallons daily. According to Mr. Henshaw the project includes the purchase of Warner's ranch, with which the New York syndicate controls 90 per cent of riparian rights on San Luis River.